



# THE DATASHEET OF BZT52-B12X





# BZT52-B series

## Single Zener diodes

Rev. 2 — 6 February 2024

Product data sheet

## 1. General description

General-purpose Zener diodes in a SOD123 small Surface-Mounted Device (SMD) plastic package.

## 2. Features and benefits

- Total power dissipation:  $P_{\text{tot}} \leq 590$  mW
- Wide working voltage range: nominal 2.4 V to 75 V (E24 range)
- Small plastic package suitable for surface-mounted design
- Low differential resistance
- Tight tolerance:  $\pm 2$  %

## 3. Applications

- General regulation functions

## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_F$	forward voltage	$I_F = 10$ mA [1]	-	-	0.9	V
$P_{\text{tot}}$	total power dissipation	$T_{\text{amb}} \leq 25$ °C [2]	-	-	590	mW
			-	-	350	mW


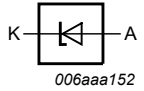
[1] Pulse test:  $t_p \leq 300$   $\mu$ s;  $\delta \leq 0.02$ .

[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm<sup>2</sup>.

[3] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

## 5. Pinning information

Table 2. Pinning

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode [1]		
2	A	anode		

[1] The marking bar indicates the cathode.

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BZT52-B2V4 to BZT52-B75 [1]	-	plastic surface-mounted package; 2 leads	SOD123

[1] The series consists of 37 types with nominal working voltages from 2.4 V to 75 V.

## 7. Marking

Table 4. Marking Codes

Type number	Marking code	Type number	Marking code	Type number	Marking code	Type number	Marking code
BZT52-B2V4	D7	BZT52-B6V2	DH	BZT52-B16	DT	BZT52-B43	E6
BZT52-B2V7	D8	BZT52-B6V8	DJ	BZT52-B18	DU	BZT52-B47	E7
BZT52-B3V0	D9	BZT52-B7V5	DK	BZT52-B20	DV	BZT52-B51	E8
BZT52-B3V3	DA	BZT52-B8V2	DL	BZT52-B22	DW	BZT52-B56	E9
BZT52-B3V6	DB	BZT52-B9V1	DM	BZT52-B24	DY	BZT52-B62	EA
BZT52-B3V9	DC	BZT52-B10	DN	BZT52-B27	E1	BZT52-B68	EB
BZT52-B4V3	DD	BZT52-B11	DP	BZT52-B30	E2	BZT52-B75	EC
BZT52-B4V7	DE	BZT52-B12	DQ	BZT52-B33	E3	-	-
BZT52-B5V1	DF	BZT52-B13	DR	BZT52-B36	E4	-	-
BZT52-B5V6	DG	BZT52-B15	DS	BZT52-B39	E5	-	-

## 8. Limiting values

**Table 5. Limiting values**

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit	
$I_F$	continuous forward current		-	250	mA	
$I_{ZSM}$	non-repetitive peak reverse current		-	see characteristics tables		
$P_{ZSM}$	non-repetitive peak power dissipation	$t_p = 100 \mu\text{s}$ ; square wave; $T_{amb} = 25 \text{ }^\circ\text{C}$ prior to surge	-	40	W	
$P_{tot}$	total power dissipation	$T_{amb} \leq 25 \text{ }^\circ\text{C}$	[1]	-	590	mW
			[2]	-	350	mW
$T_j$	junction temperature		-	150	$^\circ\text{C}$	
$T_{amb}$	ambient temperature		-55	+150	$^\circ\text{C}$	
$T_{stg}$	storage temperature		-65	+150	$^\circ\text{C}$	

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode  $1 \text{ cm}^2$ .

[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

## 9. Thermal characteristics

**Table 6. Thermal characteristics**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	350	K/W
			[2]	-	-	210	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder pint		[3]	-	-	55	K/W

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode  $1 \text{ cm}^2$ .

[3] Soldering point of cathode tab.

## 10. Characteristics

**Table 7. Characteristics**

$T_j = 25 \text{ }^\circ\text{C}$  unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
$V_F$	forward voltage	$I_F = 10 \text{ mA}$	[1]	-	-	0.9	V

[1] Pulse test:  $t_p \leq 300 \mu\text{s}$ ;  $\delta \leq 0.02$ .

Table 8. Characteristics per type; BZT52-B2V4 to BZT52-B24

 $T_j = 25\text{ °C}$  unless otherwise specified.

BZT52-B	Working voltage $V_Z$ (V);		Maximum differential resistance $r_{dif}$ ( $\Omega$ )		Reverse current $I_R$ ( $\mu\text{A}$ )		Temperature coefficient $S_Z$ (mV/K);		Diode capacitance $C_d$ (pF)[1]	Non-repetitive peak reverse current $I_{ZSM}$ (A)[2]
	$I_Z = 5\text{ mA}$		$I_Z = 1\text{ mA}$	$I_Z = 5\text{ mA}$			$I_Z = 5\text{ mA}$			
	Min	Max	Max	Max	Max	$V_R$ (V)	Min	Max	Max	Max
2V4	2.35	2.45	400	85	50	1	-3.5	0.0	450	6.0
2V7	2.65	2.75	500	83	20	1	-3.5	0.0	450	6.0
3V0	2.94	3.06	500	95	10	1	-3.5	0.0	450	6.0
3V3	3.23	3.37	500	95	5	1	-3.5	0.0	450	6.0
3V6	3.53	3.67	500	95	5	1	-3.5	0.0	450	6.0
3V9	3.82	3.98	500	95	3	1	-3.5	0.0	450	6.0
4V3	4.21	4.39	500	95	3	1	-3.5	0.0	450	6.0
4V7	4.61	4.79	500	78	3	2	-3.5	0.2	300	6.0
5V1	5.00	5.20	480	60	2	2	-2.7	1.2	300	6.0
5V6	5.49	5.71	400	40	1	2	-2.0	2.5	300	6.0
6V2	6.08	6.32	150	10	3	4	0.4	3.7	200	6.0
6V8	6.66	6.94	80	8	2	4	1.2	4.5	200	6.0
7V5	7.35	7.65	80	10	1	5	2.5	5.3	150	4.0
8V2	8.04	8.36	80	10	0.7	5	3.2	6.2	150	4.0
9V1	8.92	9.28	100	10	0.5	6	3.8	7.0	150	3.0
10	9.80	10.20	70	10	0.2	7	4.5	8.0	90	3.0
11	10.80	11.20	70	10	0.1	8	5.4	9.0	85	2.5
12	11.80	12.20	90	10	0.1	8	6.0	10.0	85	2.5
13	12.70	13.30	110	10	0.1	8	7.0	11.0	80	2.5
15	14.70	15.30	110	15	0.05	10.5	9.2	13.0	75	2.0
16	15.70	16.30	170	20	0.05	11.2	10.4	14.0	75	1.5
18	17.60	18.40	170	20	0.05	12.6	12.4	16.0	70	1.5
20	19.60	20.40	220	20	0.05	14.0	14.4	18.0	60	1.5
22	21.60	22.40	220	25	0.05	15.4	16.4	20.0	60	1.25
24	23.50	24.50	220	30	0.05	16.8	18.4	22.0	55	1.25

[1]  $f = 1\text{ MHz}$ ;  $V_R = 0\text{ V}$ [2]  $t_p = 100\text{ }\mu\text{s}$ ;  $T_{amb} = 25\text{ °C}$

Table 9. Characteristics per type; BZT52-B27 to BZT52-B51

 $T_j = 25\text{ °C}$  unless otherwise specified.

BZT52-B	Working voltage $V_Z$ (V);		Maximum differential resistance $r_{dif}$ ( $\Omega$ )		Reverse current $I_R$ ( $\mu\text{A}$ )		Temperature coefficient $S_Z$ (mV/K);		Diode capacitance $C_d$ (pF)[1]	Non-repetitive peak reverse current $I_{ZSM}$ (A)[2]
	$I_Z = 2\text{ mA}$		$I_Z = 1\text{ mA}$	$I_Z = 5\text{ mA}$			$I_Z = 5\text{ mA}$			
	Min	Max	Max	Max	Max	$V_R$ (V)	Min	Max	Max	Max
27	26.5	27.5	250	40	0.05	18.9	21.4	25.3	50	1.0
30	29.4	30.6	250	40	0.05	21.0	24.4	29.4	50	1.0
33	32.3	33.7	250	40	0.05	23.1	27.4	33.4	45	0.9
36	35.3	36.7	250	60	0.05	25.2	30.4	37.4	45	0.8
39	38.2	39.8	300	75	0.05	27.3	33.4	41.2	45	0.7
43	42.1	43.9	325	80	0.05	30.1	37.6	46.6	40	0.6
47	46.1	47.9	325	90	0.05	32.9	42.0	51.8	40	0.5
51	50.0	52.0	350	100	0.05	35.7	46.6	57.2	40	0.4

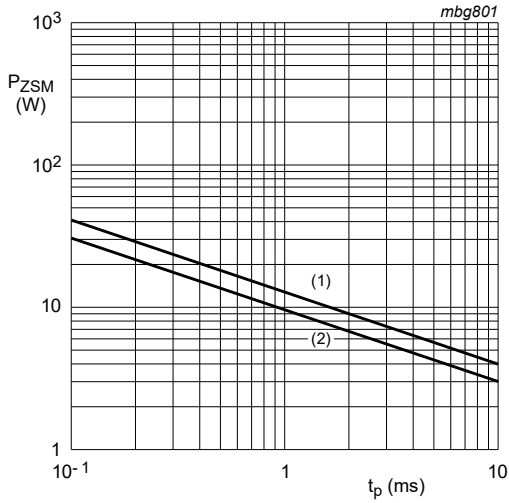
[1]  $f = 1\text{ MHz}$ ;  $V_R = 0\text{ V}$ [2]  $t_p = 100\text{ }\mu\text{s}$ ;  $T_{amb} = 25\text{ °C}$ 

Table 10. Characteristics per type; BZT52-B56 to BZT52-B75

 $T_j = 25\text{ °C}$  unless otherwise specified.

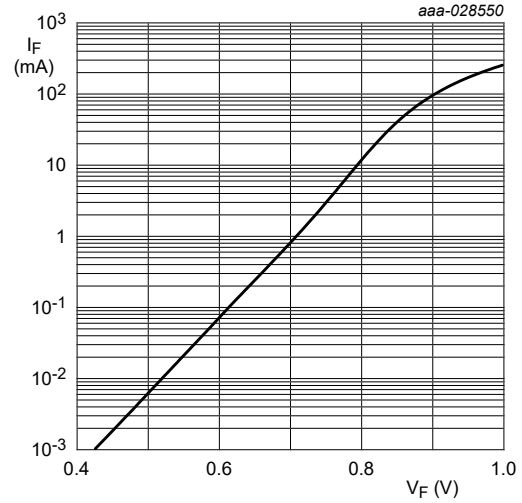
BZT52-B	Working voltage $V_Z$ (V);		Maximum differential resistance $r_{dif}$ ( $\Omega$ )		Reverse current $I_R$ ( $\mu\text{A}$ )		Temperature coefficient $S_Z$ (mV/K);		Diode capacitance $C_d$ (pF)[1]	Non-repetitive peak reverse current $I_{ZSM}$ (A)[2]
	$I_Z = 2\text{ mA}$		$I_Z = 0.5\text{ mA}$	$I_Z = 2\text{ mA}$			$I_Z = 5\text{ mA}$			
	Min	Max	Max	Max	Max	$V_R$ (V)	Min	Max	Max	Max
56	54.9	57.1	375	120	0.05	39.2	52.2	63.8	40	0.30
62	60.8	63.2	400	140	0.05	43.4	58.8	71.6	35	0.30
68	66.6	69.4	400	160	0.05	47.6	65.6	79.8	35	0.25
75	73.5	76.5	400	175	0.05	52.5	73.4	88.6	35	0.20

[1]  $f = 1\text{ MHz}$ ;  $V_R = 0\text{ V}$ [2]  $t_p = 100\text{ }\mu\text{s}$ ;  $T_{amb} = 25\text{ °C}$



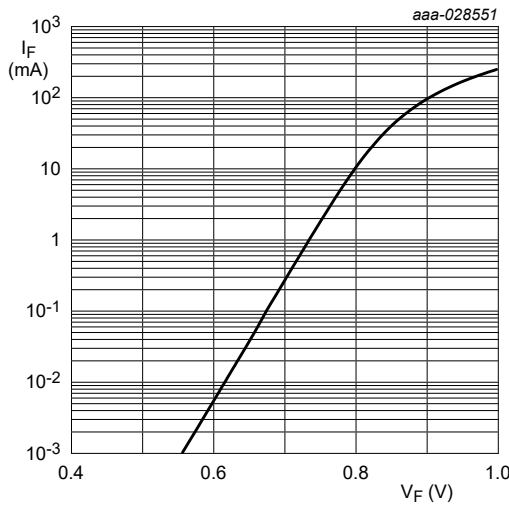
(1)  $T_j = 25^\circ\text{C}$  (prior to surge)  
 (2)  $T_j = 150^\circ\text{C}$  (prior to surge)

**Fig. 1. Non-repetitive peak reverse power dissipation as a function of pulse duration; maximum values**



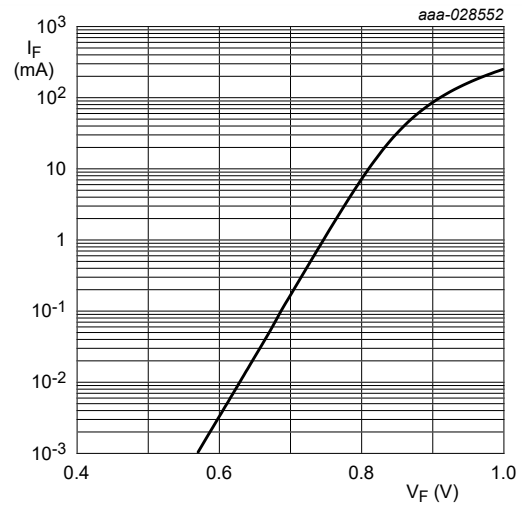
$T_j = 25^\circ\text{C}$

**Fig. 2. Forward current as a function of forward voltage; typical values (BZT52-B2V4)**



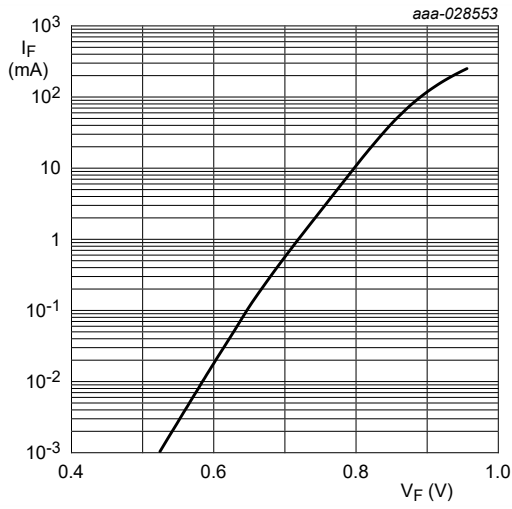
$T_j = 25^\circ\text{C}$

**Fig. 3. Forward current as a function of forward voltage; typical values (BZT52-B6V8)**

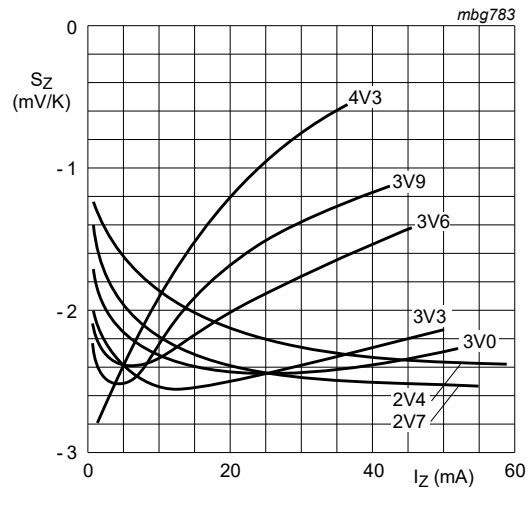


$T_j = 25^\circ\text{C}$

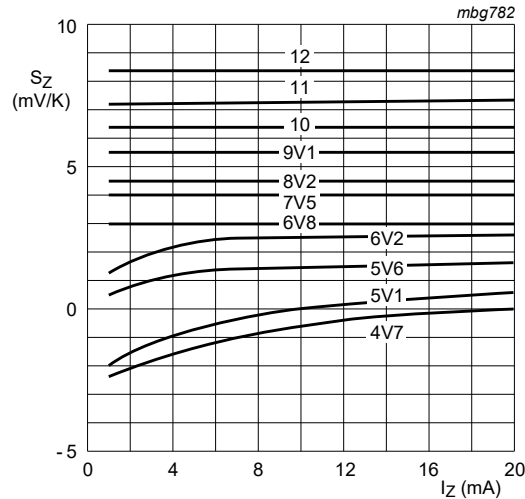
**Fig. 4. Forward current as a function of forward voltage; typical values (BZT52-B7V5)**



**Fig. 5.** Forward current as a function of forward voltage; typical values (BZT52-B75)



**Fig. 6.** Temperature coefficient as a function of working current; typical values (BZT52-B2V4 to BZT52-B4V3)



**Fig. 7.** Temperature coefficient as a function of working current; typical values (BZT52-B4V7 to BZT52-B12)

## 11. Package outline

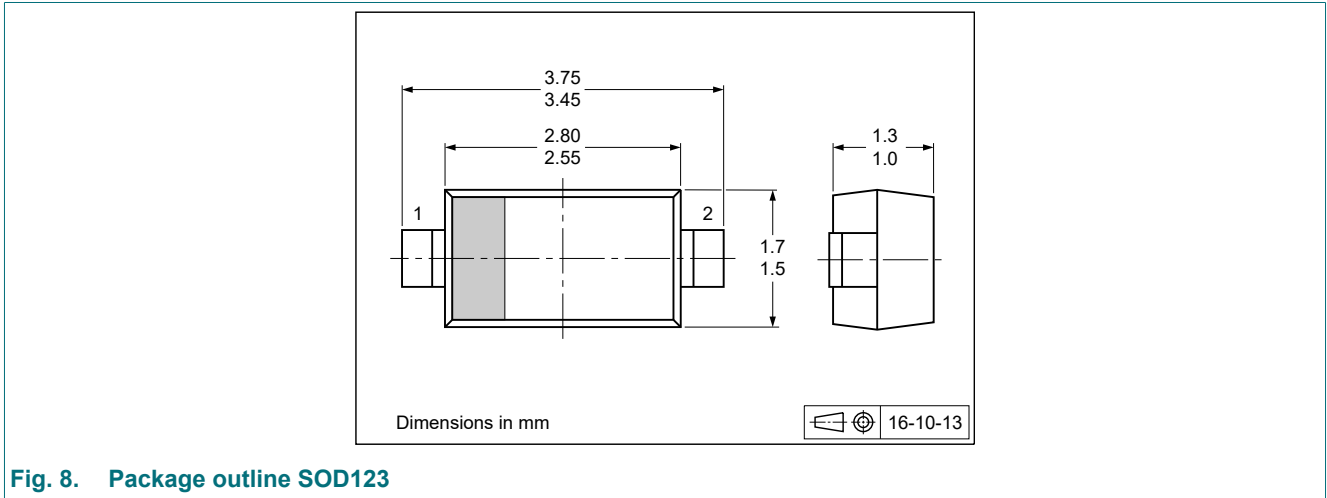


Fig. 8. Package outline SOD123

## 12. Soldering

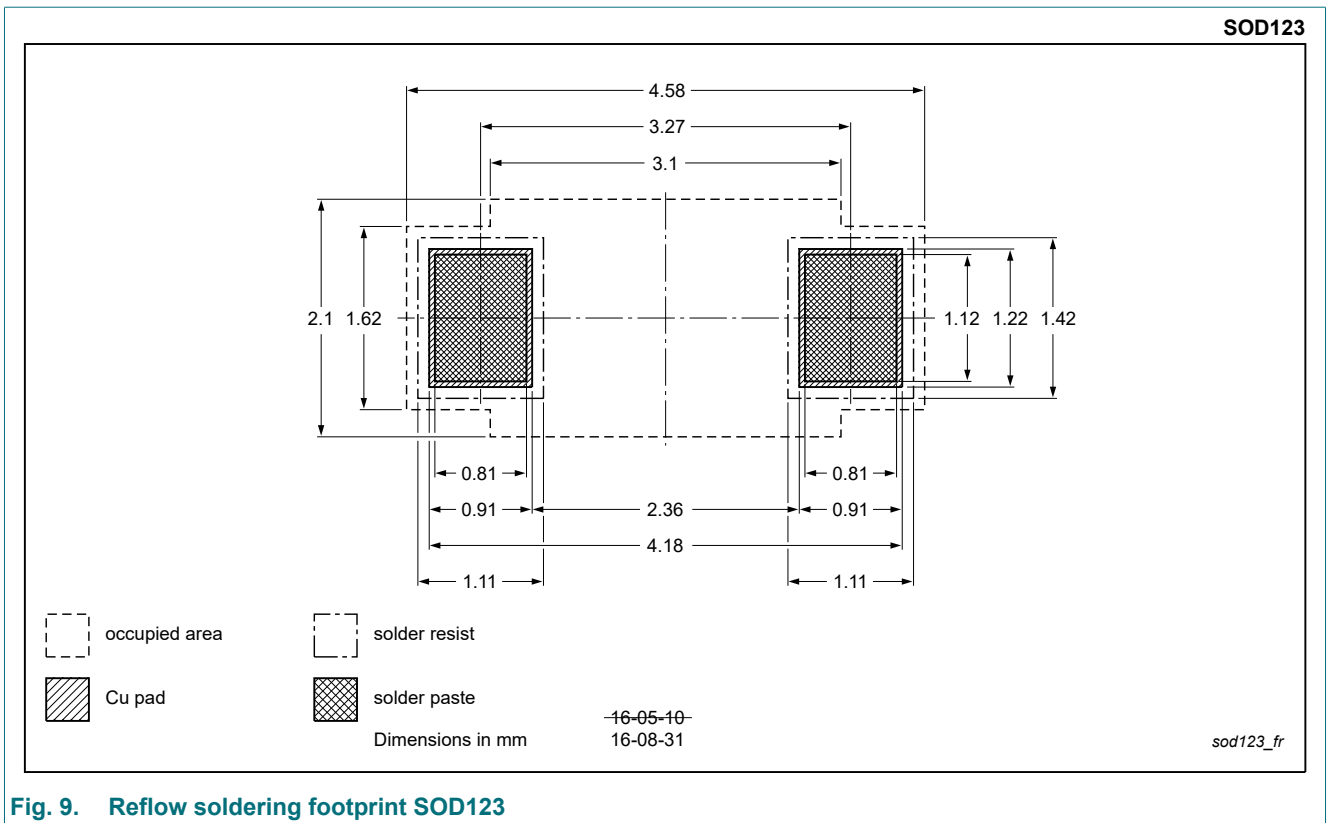


Fig. 9. Reflow soldering footprint SOD123

## 13. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BZT52-B_SER v.2	20240206	Product data sheet	-	BZT52-B_SER v.1
Modifications:	<ul style="list-style-type: none"><li>Product(s) changed to non-automotive qualification. Please refer to <a href="http://nexperia.com">nexperia.com</a> for automotive (-Q) product alternative(s).</li></ul>			
BZT52-B_SER v.1	20171220	Product data sheet	-	-

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Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

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